

AD-A153 168

THE IMPACT OF GROUP PROCESSING ON ACHIEVEMENT IN
COOPERATIVE LEARNING GRO. (U) MINNESOTA UNIV
MINNEAPOLIS COOPERATIVE LEARNING CENTER S YAGER ET AL.

1/1

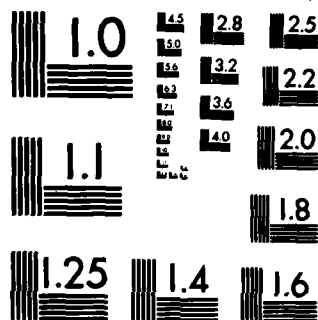
UNCLASSIFIED

20 FEB 85 CLC-004 N00015-84-K-0009

F/G 5/10

NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

AD-A153 168

DTIC FILE COPY

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

2

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER CLC-004 ✓	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) THE IMPACT OF GROUP PROCESSING ON ACHIEVEMENT IN COOPERATIVE LEARNING GROUPS		5. TYPE OF REPORT & PERIOD COVERED Technical Report
AUTHOR(s) Stuart Yager, Roger T. Johnson and David W. Johnson		6. PERFORMING ORG. REPORT NUMBER
PERFORMING ORGANIZATION NAME AND ADDRESS Cooperative Learning Center; Dept. of Ed. Psych. University of Minnesota; 202 Pattee Hall; 150 Pillsbury Drive, SE; Minneapolis, MN 55455		7. CONTRACT OR GRANT NUMBER(s) N00014-84-K-0009
CONTROLLING OFFICE NAME AND ADDRESS Group Psychology Programs Office of Naval Research (Code 4420E)		8. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 61153N 42, RR04208; NR 170-967, RR0420801
MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) Same as above Arlington, VA 22217		9. REPORT DATE February 20, 1985
		10. NUMBER OF PAGES 15
		11. SECURITY CLASS. (of this report) Unclassified
		12. DECLASSIFICATION/DOWNGRADING SCHEDULE
13. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited		
14. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
15. SUPPLEMENTARY NOTES		
16. KEY WORDS (Continue on reverse side if necessary and identify by block number) Cooperation; Achievement; Group Processing		
17. ABSTRACT (Continue on reverse side if necessary and identify by block number) The impact on achievement of (a) cooperative learning in which members discussed how well their group was functioning and how they could improve its effectiveness, (b) cooperative learning without any group processing, and (c) individualistic learning were compared on daily achievement, post-instructional achievement, and retention. Eighty-four third-grade students were randomly assigned to the three conditions stratifying for sex and		

DTIC
ELECTE
MAY 1 1985
S D

DD FORM 1 JAN 73 1473

EDITION OF 1 NOV 65 IS OBSOLETE
S/N 0102-LF-014-6601

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

20. Abstract (continued)

ability level. The results indicate that the high-, medium-, and low-achieving students in the cooperation with group processing condition achieved higher on all three measures than did the students in the other two conditions. Students in the cooperation without group processing condition, furthermore, achieved higher on all three measures than did the students in the individualistic condition. *Key words:*

Spence

group processing

**The Impact Of Group Processing On Achievement In Cooperative
Learning Groups**

Stuart Yager, University of Iowa, and

Roger T. Johnson and David W. Johnson, University of Minnesota

202 Pattee Hall

Minneapolis, Minnesota 55455

February, 1985

Running Head: Group Processing

group processing

Abstract

The impact on achievement of (a) cooperative learning in which members discussed how well their group was functioning and how they could improve its effectiveness, (b) cooperative learning without any group processing, and (c) individualistic learning were compared on daily achievement, post-instructional achievement, and retention. Eighty-four third-grade students were randomly assigned to the three conditions stratifying for sex and ability level. The results indicate that the high-, medium-, and low-achieving students in the cooperation with group processing condition achieved higher on all three measures than did the students in the other two conditions. Students in the cooperation without group processing condition, furthermore, achieved higher on all three measures than did the students in the individualistic condition.



Accession For	
NRIS CRIM	<input checked="checked" type="checkbox"/>
ETIC REP	<input type="checkbox"/>
Unpublished	<input type="checkbox"/>
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

The Impact Of Group Processing On Achievement In Cooperative Learning Groups

In addition to outcome goals, such as high achievement, cooperative learning groups typically have process goals. A process is an identifiable sequence of events taking place over time, and process goals refer to the sequence of events instrumental in achieving outcome goals. Members engage in group processing when they discuss (a) how well their group is functioning and (b) how they may improve the group's effectiveness. More specifically, group processing may be defined as reflecting on a group session to (a) describe what member actions were helpful and unhelpful and (b) make decisions about what actions to continue or change. The purpose of group processing is to clarify and improve the effectiveness of the members in contributing to the collaborative efforts to learn.

One of the current disagreements among proponents of cooperative learning is whether or not cooperative learning groups need to process how well they are functioning. Aronson, Blaney, Stephan, Sikes, and Snapp (1978), DeVries, Slavin, Fennessey, Edwards, and Lombardo (1980), Sharan and Sharan (1976), and Slavin (1983), emphasize the achievement of outcome goals only. Dishon and Wilson-O'Leary (1984), Johnson and Johnson (1975), and Johnson, Johnson, Holubec and Roy (1984), however, emphasize that cooperative learning groups need to process how well they are functioning in order to maximize their effectiveness. This latter view follows the group dynamics literature which has emphasized the importance of group processing (Cartwright & Zander, 1968; Johnson & F. Johnson, 1982; Napier & Gerschenfeld, 1981; Schmuck & Schmuck, 1974). No direct evidence exists, however, as to which view is most valid.

There are at least two models of group processing (Johnson, 1979; Johnson

& F. Johnson, 1982). The first is a "counseling" model that posits that self-examination leads to insight which leads to increased effectiveness. From this view group processing consists of members of the group examining the group's functioning (self-examination), which facilitates identification of and insight into strengths and problems in functioning, which leads to planning for more effective actions to be taken by group members in the future. Sarason and Potter (1983), for example, examined the impact of individual self-monitoring of thoughts on self-efficacy and successful performance and found that having individuals focus their attention on self-efficacious thoughts is related to greater task persistence and less cognitive interference. They conclude that the more people are aware of what they are experiencing, the more aware they will be of their own role in determining their success.

The second is the feedback model (Johnson, 1979). From this model group processing is aimed at providing accurate and nonthreatening feedback concerning the procedures the group is using to achieve its outcome goals. The feedback gives students information that helps them improve performance. And it reinforces students for engaging in collaborative skills. Both the information and reinforcement aspects of feedback are viewed as important aspects of group processing.

Despite which model is used, there currently is no evidence that group processing can in fact increase the productivity of students working within cooperative learning groups. The first purpose of this study is to compare the achievement of members of cooperative learning groups that do and do not process their functioning. Three achievement measures are used: Daily achievement, achievement at the end of an instructional unit, and retention

over a three-week period. The achievement of students in both cooperative conditions are compared with the achievement of students learning individualistically.

The daily assignments in the cooperative conditions are completed as a group. In the individualistic condition the daily assignments are completed individually. Since the post and retention tests were completed individually by all students, it is possible to compare group-to-individual transfer with individual-to-individual transfer. There is mixed evidence as to whether or not material learned in groups transfers to performance in a subsequent individual testing situation (Gabbert, Johnson, & Johnson, 1984; Laughlin & Barth, 1981). The second purpose of this study is to add further evidence on this issue.

The third purpose of the study is to examine the impact of participating in heterogeneous cooperative learning groups on high-, medium-, and low-achieving students. It has been posited that medium- and low-ability students may hinder the performance of high-ability students (Hill, 1982) and that low-ability students cooperating with high- and medium-ability peers are simply told the answers and do not learn how to do the work on their own and, therefore, do not benefit from the collaboration (Slavin, 1984). Other researchers conclude that cooperative learning in heterogeneous groups benefits high-, medium-, and low-ability students (Frick, 1973; Skon, Johnson, & Johnson, 1981; Webb, 1977; Yager, Johnson, & Johnson, 1985). The results of this study will add further evidence to this issue.

Method

Sample

Subjects were 84 third-grade, middle-class students from a midwestern

group processing

school district. The sample consisted of 44 male and 40 female students. All students were randomly assigned to conditions stratifying for sex and ability (determined by score on standardized tests administered to third-graders by the school district). Twenty-eight students were assigned to each condition. In the cooperative conditions, the students were randomly assigned to one of seven learning groups of four members, again stratifying on the basis of sex and ability level.

Independent Variable

Two independent variables were included: (a) cooperation with group processing, cooperation without group processing, and individualistic learning, and (b) ability level of students. In the cooperative learning conditions, students were randomly assigned to groups of four, stratifying for sex and ability levels. Within each cooperative condition there were seven groups of four students. Within each group there was at least one high-, one medium-, and one low-achieving student. In six of the groups there were two male and two female students, and in one group there were three male and one female students. Students were instructed to work together as a group, completing one set of papers as a group while ensuring that group members master the material, with all group members giving their ideas and suggestions, and with the teacher praising and rewarding the group as a whole. Students took the tests individually with the scores for each group member being totaled and averaged. Students were graded on the basis of their group's average score, which was compared to a preset criterion of excellence. Each experimental session was divided into two parts. The first consisted of a 30 minute group study time. During the group study time content was introduced and the students worked together to complete the assignment. The

group processing

second part varied according to condition. In the **cooperation with group processing condition**, there was a 5 minute group processing time during which students reflected on that day's session, analyzed and discussed any problems the group had in working together, commented on the positive behaviors of group members, and set goals for working collaboratively during the next session. In the **cooperative learning with no processing condition** students spent the last five minutes of each session collecting and organizing their materials. In the **individualistic condition**, students were instructed to work on their own, avoiding interaction with other students, seeking help and assistance from only the teacher, working at a self-regulated pace, and completing as much of the assignment as possible. The teacher praised and rewarded each student on the basis of how his or her performance compared to a preset criterion of excellence.

The **ability level** of students was determined by achievement scores on a standardized test given by the school district to all third graders. The top 1/3 of the students were classified as high-ability, the middle 1/3 as medium-ability, and the bottom 1/3 as low-ability.

Dependent Variable

The dependent variable was student achievement. Three achievement tests were given individually to all students: A pretest consisting of 50 multiple-choice items (given one day before the beginning of the session); an achievement test given in two parts, the first half (consisting of 25 multiple-choice items) given after 12 instructional sessions and the second half (consisting of 25 multiple-choice items) given at the end of the 25 session unit; and a retention test given 21 days after the end of the instructional unit that consisted of 50 multiple-choice items (25 from each

group processing

half of the instructional unit). The tests were constructed by the teacher to measure factual recognition of the concepts and principles in the unit. The achievement test had an average difficulty of 55 percent and a reliability of .84 using Kuder and Richardson's Formula 21. The retention test had an average difficulty of 52 percent and a reliability of .88 using Kuder and Richardson's Formula 21.

In addition, achievement was measured daily by scoring the daily worksheets. In the two cooperative conditions one worksheet was completed by each group. In the individualistic condition, each student completed a worksheet.

Procedure

Students in each condition were together for 35 minutes a day for 25 instructional days. The instructional content of the lesson consisted of a transportation unit that is required by the school district for third grade (Our Neighbors, 1980). The three conditions met on the same days in the same room. The meeting times alternated to give each group an equal amount of class time at each time period. Before the beginning of the instructional unit, three experimental sessions were spent with each condition to teach the students the behaviors required by their condition. After 12 class sessions all students were given mid-unit achievement test. At the end of 25 class sessions the students were given a second unit achievement test. Student scores on the two tests were summed to determine their achievement. Three weeks after the end of the instructional unit, students were given a retention test covering all of the material contained in the unit.

Validation of Conditions

Unscheduled and unannounced observations of the three conditions were

made four times a week. The results indicate that the three conditions were being implemented accurately and effectively.

Analyses

A 3x3 ANOVA was conducted with Newman-Kuels post-hoc comparisons to determine the differences among conditions. A 1x3 ANOVA was used to analyze daily achievement.

Results

The results of the pretest indicate that there were no significant differences between the cooperation with processing, cooperation without processing, and individualistic conditions. The high ability students were highest on the measure, the medium ability students were next, and the low ability students scored the lowest, $F(2,75) = 50.20, p < .001$.

On the daily achievement measure the cooperative groups achieved significantly higher than did the students in the individualistic condition, $F(2,39) = 11.31, p < .001$ (Cooperative-Processing Mean = 147.29, Cooperative-No-Processing Mean = 139.00, Individualistic Mean = 127.79). The students in the cooperative-processing condition achieved a 94 percent accuracy rate on their daily assignments, the students in the cooperative-no-processing condition achieved an 89 percent accuracy rate, and the students in the individualistic condition achieved an 82 percent accuracy rate.

The results of this study indicate that students in the cooperative-learning-with-processing condition achieved higher on the achievement post-test than did the students in the other two conditions, and the students in the cooperative-learning-with-no-processing condition achieved higher than did the students in the individualistic condition, $F(2,75) = 112.51, p < .001$.

Similar results were found for achievement on the retention test, $F(2,75) = 172.12$, $p < .001$. The findings hold for high, medium, and low ability students. In addition, high ability students achieved higher than did the medium and low ability students, and the medium ability students achieved higher than did the low ability students on both the post-test, $F(2,75) = 103.26$, $p < .001$, and the retention test, $F(2,75) = 63.73$, $p < .001$.

There are significant interaction effects for both the post-achievement test, $F(4,75) = 5.05$, $p < .001$, and the retention test, $F(4,75) = 9.78$, $p < .001$. In both cases, the difference between the high and low ability students is less in the two cooperative conditions than in the individualistic condition.

Discussion

It is a truism in group dynamics that to be productive groups have to "process" how well they are working and take action to resolve any difficulties members have in collaborating together productively. Group processing, however, has been relatively ignored in most models of cooperative learning. There has been no attempt to investigate the impact of group processing on group productivity. In addition, while a great deal of attention has been paid to structuring materials and organizing instruction to promote cooperative learning, little attention has been focused on training teachers (and students) to promote the processing by group members of their collaborative efforts to achieve. Theoretically, empirically, and practically, group processing has been ignored.

The results of this study provide strong evidence that having members of cooperative learning groups discuss how well their group is functioning and how they may improve it's effectiveness has a sizable and positive effect on

group processing

student achievement. Through gaining insight into how to behave more effectively and/or generating feedback that informs group members how to improve their effectiveness and reinforces them for engaging in collaborative skills, members increase their productivity. Up to three weeks after the end of the instructional unit, their achievement gains stay considerably higher than members of cooperative learning groups that did not process their functioning and students working individualistically. One explanation of the relationship between group processing and group productivity is that the processing increases students' self-efficacy through directing attention towards skillful collaborative behavior and through reducing personal inhibitions (such as self-doubts and self-preoccupation) (Sarason & Potter, 1983).

Students within the cooperative learning groups that did not process their functioning achieved higher and retained the information better than did the students working individualistically. These findings corroborate the previous research indicating that cooperation promotes higher achievement and better retention than do individualistic efforts (Johnson, Maruyama, Johnson, Nelson, & Skon, 1981; Sharan, 1980). The results, furthermore, are especially strong for low- and medium-achieving students. This latter finding is of some interest as proponents of individualistic learning (e.g., Hill, 1982; Slavin, 1984) have hypothesized that low- and medium-ability students who are placed in cooperative learning groups with high-ability classmates will suffer academically.

Finally, the results of this study indicate that cooperative learning experiences result in group-to-individual transfer. The material learned within a group discussion was transferred to subsequent individual testing situations.

References

- Aronson, E., Blaney, N., Stephan, C., Sikes, J., & Snapp, M. (1978). The jigsaw classroom. Beverly Hills, CA: Sage.
- Cartwright, D., & Zander, A. (Eds.) (1968). Group dynamics. New York: Harper & Row.
- DeVries, D., Slavin, R., Fennessey, G., Edwards, K., & Lombardo, M. (1980). Teams-games-tournament: The team learning approach. Englewood Cliffs, NJ: Educational Technology Publications.
- Dishon, D., & O'Leary, P. (1984). A guidebook for cooperative learning. Kalamazoo, MI: Learning Publications.
- Frick, F. (1973). Study of peer training with the Lincoln Training System (AFATC Report KE 73-116), Keisler Air Force Base, MI.
- Gabbert, B., Johnson, D. W., & Johnson, R. (1984). Group-to-individual transfer, process gain, and the acquisition of cognitive reasoning strategies in cooperative learning groups. Manuscript submitted for publication.
- Hill, G. (1982). Group versus individual performance: Are N + 1 heads better than one? Psychological Bulletin, 91, 517-539.
- Johnson, D. W. (1979). Educational psychology. Englewood Cliffs, NJ: Prentice-Hall.
- Johnson, D. W., & Johnson, F. (1982). Joining together: Group theory and group skills. Englewood Cliffs, NJ: Prentice-Hall.
- Johnson, D. W., & Johnson, R. (1975). Learning together and alone: Cooperation, competition, and individualization. Englewood Cliffs, NJ: Prentice-Hall.

group processes

- Johnson, D. W., Johnson, R., Holubec, E., & Roy, P. (1984). Circles of learning. Washington, D.C.: The Association for Supervision and Curriculum Development.
- Johnson, D. W., Maruyama, G., Johnson, R., Nelson, D., & Skon, L. (1981). The effects of cooperative, competitive, and individualistic goal structures on achievement: A meta-analysis. Psychological Bulletin, 89, 47-62.
- Laughlin, P., & Barth, J. (1981). Group-to-individual and individual-to-group problem-solving transfer. Journal of Personality and Social Psychology. University of Illinois.
- Napier, R., & Gerschenfeld, M. (1981). Groups: Theory and experience. Boston: Houghton-Mifflin.
- Sarason, I., & Potter, E. (1983). Self-monitoring: Cognitive processes and performance. University of Washington, Seattle, Washington, mimeographed report.
- Schmuck, R., & Schmuck, P. (1974). A humanistic psychology of education. Palo Alto, CA: National Press Books.
- Sharan, S. (1980). Cooperative learning in small groups: Recent methods and effects on achievement, attitudes, and ethnic relations. Review of Educational Research, 50, 241-271.
- Sharan, S., & Sharan, Y. (1976). Small group teaching. Englewood Cliffs, NJ: Educational Technology Publications.
- Slavin, R. (1983). Cooperative learning. New York: Longman.
- Slavin, R. (1984). Meta-analysis in education: How has it been used? Educational Researcher, 13(October), 6-15.

group processing

Webb, N. (1977). Learning in individual and small group settings

(Technical Report No. 7). Washington, D.C.: Personnel and
Training Research and Advanced Research Projects Agency.

Yager, S., Johnson, D. W., & Johnson, R. (1985). Oral discussion,
group-to-individual transfer and achievement in cooperative
learning groups. Journal of Educational Psychology, in press.

Table 1
Mean Scores on Achievement Measures

	Cooperation with Processing			Cooperation with No Processing			Individualistic			F
	High	Middle	Low	High	Middle	Low	High	Middle	Low	
Pre-Test	29.67	26.20	21.56	28.22	25.40	21.11	29.11	24.60	19.67	Abil: 50.20*
Post Test	48.00	43.00	39.78	43.56	38.10	34.89	40.56	31.90	24.89	Coop: 112.51* Abil: 103.26* Int: 5.05*
Retention	45.33	44.20	41.10	39.67	37.60	32.78	37.22	28.50	21.67	Coop: 172.12* Abil: 63.73* Int: 9.78*

*p < .001

Note: Abil = Ability; Coop = Cooperation; Int = Interaction

group processing

DISTRIBUTION LIST

**LIST 1
MANDATORY**

Defense Technical Information Center (12 copies)
ATTN: DTIC DDA-2
Selection and Preliminary Cataloging Section
Cameron Station
Alexandria, VA 22314

Library of Congress
Science and Technology Division
Washington, D.C. 20540

Office of Naval Research (3 copies)
Code 4420E
800 N. Quincy Street
Arlington, VA 22217

Naval Research Laboratory (6 copies)
Code 2627
Washington, D.C. 20375

Office of Naval Research
Director, Technology Programs
Code 200
800 N. Quincy Street
Arlington, VA 22217

Psychologist
Office of Naval Research
Detachment, Pasadena
1030 East Green Street
Pasadena, CA 91106

END

FILMED

5-85

DTIC